BANK OF CANADA
BANQUE DU CANADA

Technical Report No. 105 / Rapport technique n° 105

Shock Transmission Through International Banks: Canada

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www.bank-banque-canada.ca

September 2015

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ISSN 1919-689X

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Acknowledgements

Hong Xiao provided excellent research assistance.

Abstract

In this paper, we investigate how liquidity conditions in Canada may affect domestic and/or foreign lending of globally active banks and whether this transmission is influenced by individual bank characteristics. We find that Canadian banks expanded their foreign lending during the recent financial crisis, often through acquisitions of foreign banks. We also find evidence that internal capital markets play a role in the lending activities of globally active Canadian banks during times of heightened liquidity risk.

JEL classification: E44, F36, G21, G32
Bank classification: Financial institutions; Financial stability

Résumé

Dans cette étude, nous nous intéressons à la manière dont les conditions de liquidité au Canada influent sur l'activité de prêt des banques internationales dans leur pays d'attache et sur les marchés étrangers. Nous nous demandons si l'incidence des conditions de liquidité dépend des caractéristiques des établissements bancaires. Il ressort de l'étude que les banques canadiennes ont intensifié leur activité de prêt à l'étranger pendant la récente crise financière, souvent par l'acquisition de banques étrangères. Il apparaît également que les marchés de capitaux nationaux influencent l'activité de prêt des banques canadiennes présentes à l'international dans les périodes d'exacerbation du risque de liquidité.

Classification JEL : E44, F36, G21, G32
Classification de la Banque : Institutions financières; Stabilité financière

1 Introduction

Over the past decade and a half, banks have become increasingly global in their business activities, although this expansion has in general been disrupted by the global financial crisis of 2008-09. As a result, globally active banks have featured prominently in discussions on the causes and effects of the crisis. For example, recent work by Cetorelli and Goldberg (2012) and Cornett et al. (2011) have analyzed how the crisis, specifically liquidity crunches in developed countries, was transmitted via bank internal capital markets (borrowing/lending between a bank's head office and its foreign affiliates) to developing and emerging economies. However, interest in the transmission of financial shocks through globally active banks predates the recent financial crisis; Peek and Rosengren (1997) is an earlier example in this literature.

Despite the interest in globally active banks and their role in shock transmission, certain questions currently remain unanswered. What kind of globally active banks are more likely to transmit financial shocks across borders? What specific role does the size of a bank's internal capital market play in this transmission? Do the official liquidity facilities often made available to the financial sector during a crisis play a role in the international transmission of shocks? This study tries to answer some of these questions as part of a broader initiative.[1]

In this paper, we use the econometric techniques of Cornett et al. (2011) to explore the experiences of global Canadian banks in the period around the global financial crisis. This allows us to explore how shocks to the Canadian banking system were transmitted to other

[1]This paper represents the Canadian contribution to the "International Banking and Liquidity Risk Transmission: Lessons from Across Countries" initiative of the International Banking Research Network (IBRN). Established in 2012, the IBRN brings together researchers from different central banks to analyze issues pertaining to globally active banks. The goal of the IBRN is to enable the use of micro-level data on individual banks that is available at different central banks. IBRN research initiatives involve teams of researchers within individual central banks utilizing their own data, while following a common methodology, in order to analyze issues related to globally active banks in their own countries. More information on the IBRN can be found at http://www.newyorkfed.org/IBRN/index.html, while Buch and Goldberg (2014) provides details of the "International Banking and Liquidity Risk Transmission: Lessons from Across Countries" initiative.

countries via the banks' cross-border activities.[2]

To understand these effects, we use balance sheet data from regulatory returns of Canadian banks. This relatively rich set of bank accounting data has been used recently by Damar et al. (2013) to understand the procylicality of leverage and by Damar et al. (2014) to study how a funding shock to a bank affects the consumption decisions of its clients. While our work is related to the former paper, we differ in two key ways: first, we study the loan book as opposed to the trading book of the bank; and second, our work is much more comparable to other studies such as those described in Buch and Goldberg (2014).

We find evidence that during and shortly after the crisis, Canadian banks expanded into foreign markets due to their relatively healthy balance sheets compared to other banks. These effects are qualitatively in line with other studies of the Canadian banking system during the crisis such as Ratnovski and Huang (2009) and Allen et al. (2011), who have similar findings. Specifically, we find that the impact on lending is large; it is approximately in the (-15%, 15%) range for total lending and in the (-10%, 9%) range for domestic lending.

2 Data, Banking Sector Overview and Sample Construction

2.1 Data Sources

Our data come from the regulatory returns filed by all federally chartered financial institutions in Canada.[3] Globally consolidated bank-time level data are obtained from the monthly "Balance Sheet" form, with the exception of banks' Tier 1 capital ratios, which are obtained from

[2]Given that our analysis follows the common methodology used for the International Banking Research Network (IBRN) research initiative, we refrain from explaining the common empirical methodology in detail or providing variable definitions in this paper (although some details on our regression variables are provided in the appendix). Instead, we refer the interested reader to Buch and Goldberg (2014).

[3]The forms used in this study can be found at the website of the bank regulator, the Office of the Superintendent of Financial Institutions, at http://www.osfi-bsif.gc.ca/Eng/fi-if/rtn-rlv/fr-rf/dti-id/Pages/default.aspx.

the quarterly "Basel Capital Adequacy Return." The breakdown of loans between domestic and foreign lending comes from the "Regional Distribution of Selected Assets and Liabilities" form. This form reports loans booked outside of Canada, which we interpret as foreign lending. Subtracting these foreign loans from the total lending yields domestic lending.

The main drawback of the "Regional Distribution of Selected Assets and Liabilities" form is that it does not report all individual loan categories (such as loans to financial institutions). Total loans as reported in this form are always smaller than the total loans reported in the consolidated "Balance Sheet," although the discrepancy is usually small, given that the excluded loan categories do not feature prominently in Canadian banks' balance sheets. Therefore, we use the total loan figure from the "Balance Sheet," while using the (slightly incomplete) figures on foreign loans and domestic loans from the "Regional Distribution of Selected Assets and Liabilities" form.

Data on the activities of foreign affiliates come from the form "Geographic Assets and Liabilities Booked Outside Canada." This form is completed only by banks with foreign affiliates, and it contains bank-country-time level information on local claims and liabilities. Unfortunately, the form does not indicate whether a local claim (or liability) in country i was booked by an affiliate of the bank located in country i or by an affiliate in country j. In fact, the regulatory data used in this study do not contain any information on where Canadian banks' affiliates are located and the different lines of business these affiliates are engaged in.

Finally, information on cross-border activities originating in Canada is obtained from the return "Geographic Assets and Liabilities Booked In Canada." This form also contains bank-country-time level data on the cross-border claims and liabilities of Canadian banks on a residency basis. This form is completed by all commercial banks in Canada.[4]

[4]Please refer to http://www.osfi-bsif.gc.ca/Eng/fi-if/rtn-rlv/fr-rf/dti-id/Pages/default.aspx for the actual forms and the relevant filing instructions.

2.2 Banking Sector Overview and Sample Construction

The Canadian banking sector consists of federally chartered commercial banks, trust and loan companies and foreign bank branches.[5] The sector has traditionally been dominated by six large national banks, known as the "Big Six": Bank of Montreal, Bank of Nova Scotia, Canadian Imperial Bank of Commerce, National Bank of Canada, Royal Bank of Canada and Toronto-Dominion Bank Group. Collectively, the Big Six banks account for approximately 90% of the total assets in the banking sector, and a significant number of the trust and loan companies and all major broker-dealers are subsidiaries of the Big Six. Most of the remaining Canadian banks are subsidiaries of foreign banks. But other domestically owned banks also operate in Canada. These smaller domestic banks usually differ from the Big Six by size and by balance sheet composition.[6] As discussed below, these differences between the Big Six and non-Big Six banks play a role in our findings, especially those related to the interaction of liquidity risk with bank size.

This study concentrates on domestic commercial banks, since trust and loan companies do not complete the regulatory returns needed to construct the data set. Given our focus on the potential outward transmission of liquidity, subsidiaries and branches of foreign banks are excluded from the sample. We excluded small banks with assets of less than 1 billion Canadian dollars (CAD) as well.[7] Finally, we eliminated the few observations in which the growth rate of real assets exceeds $\pm 10\%$ to make sure that our results are not driven by outliers. The final sample consists of 10 domestic banks: the Big Six, which have both foreign affiliates and cross-border claims, and four domestic banks with cross-border claims only.[8]

[5] A large number of provincially chartered credit unions and co-operative credit institutions also exist in Canada. These are excluded from this study, given that they are entirely provincially regulated and, with one exception, have almost no foreign claims.

[6] Please refer to Chen et al. (2012) for a detailed comparison of different groups of banks in Canada.

[7] These small banks were excluded in accordance with the common research methodology of the IBRN research initiative (which, in turn, is motivated by the large number of small banks in some of the other countries participating in the initiative). In all, nine domestic banks were dropped from the sample because they had less than 1 billion CAD in assets (in 2012 CADs) throughout the entire sample period.

[8] Two of these four banks with cross-border claims are not included throughout our entire sample period.

Table 1 provides a comparison of the two different groups of Canadian banks. The levels of liquidity and capital across these two groups appear to be quite similar. Banks that have both local and cross-border claims (referred to as "banks with foreign affiliates" from here on) are much larger and are less likely to fund their operations via core deposits. Compared to banks with only cross-border claims, banks with foreign affiliates also seem to have a more diversified asset portfolio. This diversification seems to hold geographically and across business lines (lower loan-to-asset ratios). Furthermore, almost all of the foreign claims of these banks are booked through affiliates.

Finally, it is clear that central bank liquidity facilities have the potential to play an important role in our research question. These official facilities can dampen the impact of elevated liquidity risk on bank lending by providing cheaper (than the high market price) liquidity to banks. In Canada, two main liquidity facilities were made available to banks between 2007 and 2010. These were the Term Purchase and Resale Agreement (Term PRA) and the Insured Mortgage Purchase Program (IMPP).

The first facility was the Bank of Canada's Term PRA, which was designed to provide funding to Canadian Primary Dealers and Direct Participants in the Canadian Large Value Transfer System. This program began in 2007Q4, and the last Term PRA matured in 2010Q3. At its peak, the amount outstanding was $37 billion.[9] The second facility, the IMPP, was available between 2008Q4 and 2010Q1. The IMPP was administered by the Canada Mortgage and Housing Corporation (CMHC), which bought $125 billion of federally insured mortgage-backed securities from Canadian financial institutions via a reverse auction.[10]

Although it would be ideal to include both facilities in the empirical analysis, the lack

One of these banks fell below the 1 billion CAD limit before the end of our sample period, while the other only exceeded the 1 billion CAD limit a few quarters after the start of our sample period.

[9]The interested reader can find more details about the Bank of Canada's Term PRAs in Enenajor et al. (2010) or Allen et al. (2011).

[10]Given its focus on mortgage backed securities, IMPP had a higher number of participants than the Term PRA.

of data on individual banks' IMPP access makes this task difficult.[11] Term PRA will be the main focus of the empirical analysis, since we have access to confidential data on the use of the facility by individual banks. Given the short duration of the Term RPA transactions, for each bank the "net borrowing" from the facility can be calculated. This allows for the creation of an indicator variable that takes the value of one if the bank's net borrowing in a given quarter is greater than zero.[12] This variable has both time and cross-sectional variation, since not all banks borrowed on net from the facility.

3 Empirical Analysis

As described in detail by Buch and Goldberg (2014), the empirical analysis explores how banks' funding conditions affect their loan growth. We begin with the following regression specification:

$$\begin{aligned} \Delta Y_{i,t} &= \gamma_i + \mu_t + (\beta^0 + \beta^1[LIBOR - OIS_t])X_{i,t-1} \\ &+ (\alpha^0 + \alpha^1[LIBOR - OIS_t] \cdot X_{i,t-1} + \alpha^2 \cdot X_{i,t-1} + \alpha^3[LIBOR - OIS_t])F_{it} + \epsilon_{i,t}, \end{aligned} \tag{1}$$

where Y_{it} is a measure of lending by bank i at time t, and $X_{i,t-1}$ is a vector of control variables (lagged by one quarter) capturing the degree to which a bank is exposed to liquidity risk through its balance sheet composition and market access. In addition, the variables in $X_{i,t-1}$ are interacted with the Canadian-dollar LIBOR over OIS spread ($LIBOR - OIS_t$), which

[11] We could follow a conservative approach and assume that any bank that had insured residential mortgages on its balance sheet during the period 2008Q4-2010Q1 is categorized as having "access" to the IMPP facility. Since all of the banks in the sample had such mortgages on their balance sheets, the IMPP eligibility variable takes the form of a period dummy, with no cross-sectional variation.

[12] Using a continuous variable such as *Net Term PRA Borrowings/Total Assets* in the analysis is complicated for two reasons. First, this ratio is usually relatively small, with a few large outliers potentially driving any results that might be obtained. Second, and more importantly, the official support to Canadian banks was of much shorter duration than in other countries, and the Canadian banks repaid the borrowings much faster. Therefore, this variable is frequently negative as banks repaid their Term PRAs. Since this complicates the interpretation of the coefficient, we instead used an indicator variable.

is used as a measure of overall liquidity in the financial system.[13] These interaction terms capture how differences in balance sheet characteristics can influence the way banks adjust their lending behavior in response to funding shocks.

The presence of bank and time fixed effects in equation (2) (γ_i and μ_t, respectively) implies that the coefficients on the interaction terms (β^1) measure how banks' balance sheet structure affects the response of lending to liquidity risk in a manner similar to Cornett et al. (2011). If an alternative specification without bank fixed effects is estimated (as in our appendix), then β^1 should capture the impact of both absolute and cross-sectional differences in balance sheet composition on the "lending-liquidity risk" link. The precise definitions of our dependent and independent variables, including the relevant data sources, can be found in the appendix (table A1).

In order to account for the potential effect of official liquidity facilities in equation (2), we include interaction terms between our variables and the indicator variable F_{it}. F_{it} takes the value of one if bank i's net borrowing from the Term PRA facility at time t is greater than zero.[14] F_{it} has both time and cross-sectional variation, since not all banks borrowed on net from the facility (as opposed to the other main liquidity facility, the IMPP). The inclusion of F_{it} and its interactions addresses the possibility that $LIBOR-OIS_{it}$ is also serving as a proxy for banks' use of central bank liquidity facilities, since banks are more likely to access such liquidity facilities at times of heightened liquidity risk. Accordingly, the overall sensitivity of lending to liquidity risk during periods of central bank facility availability/use (through balance sheet characteristics) is measured by $\beta^1 + \alpha^1$.

Summary statistics for all the dependent ($Y_{i,t}$) and independent variables ($X_{i,t}$), including

[13] In the appendix (table A4), we present results when the U.S.-dollar LIBOR over OIS spread is used as a measure of liquidity instead. Almost all of our main conclusions remain robust to these specifications, although we obtain weaker statistical significance for one of them. We opted against including both the USD and CAD LIBOR-OIS spreads in the estimation simultaneously, since the high degree of correlation between the two spreads (0.83) causes clear multi-collinearity issues, leading to findings that are not informative.

[14] See note 12.

central bank liquidity facility use (F_{it}), are given in table 2. In addition to confirming the differences between the Big Six banks (which are included in both groups) and the non-Big Six banks (which are only included in the "With Cross-Border Claims" group), table 2 also provides some insights into Canadian banks' internal capital markets. The mean and median amounts of net head office claims on foreign affiliates (*Net Due To/Liabilities*) suggest that globally active Canadian banks have fairly small internal capital markets.[15] As discussed below, this does not mean that internal capital markets do not play a role in the interaction of liquidity risk and bank lending; nevertheless, it is possible that Canadian banks have smaller internal capital markets compared to their foreign peers. One potential explanation for this observation is that Canadian affiliates tend to be somewhat independent of their parents. This decentralized structure could be due to the establishment of the more prominent Canadian affiliates through acquisitions of already well-established foreign banks, as opposed to greenfield entry through branches or subsidiaries. As a result, Canadian parents seem to have maintained the identity and operations of their affiliates post-merger.[16] However, findings of our empirical analysis will suggest that head offices of Canadian banks utilize internal capital markets under certain conditions (such as high liquidity risk).

The results for the estimation of equation (2) for all Canadian banks with cross-border claims are given in panel A of table 3 below. These suggest that during periods of low liquidity and no central bank facility use, larger Canadian banks tend to increase their domestic lending. This is due to the nature of our sample of banks with cross-border claims: the six largest banks (out of ten) in this sample have a more balanced mixture of core vs. wholesale deposits. Therefore, it is highly likely that when liquidity risk is high and no central bank facilities are available (i.e., before 2008), these larger banks take advantage of the funding problems of

[15] While we can't discuss the *(Claims on Affiliates)/Assets* and *(Liabilities to Affiliates)/Liabilities* variables due to data confidentiality issues, these individual components of *(Net Due To/Liabilities)* are also consistently under 10% throughout our sample period.

[16] For example, the Bank of Montreal's U.S. affiliate was established by the acquisition of Harris Bank (a mid-sized regional bank based in Chicago) in 1984, while the Bank of Nova Scotia entered Mexico in 2000 by acquiring the then-seventh-largest bank (Groupo Financiero Inverlat). Similarly, Toronto-Dominion Bank established its U.S. affiliate by acquiring Banknorth (a mid-sized regional bank in New England) in 2004.

their smaller, more wholesale funding-dependent competitors and capture even more market share.

On the other hand, during periods of high liquidity risk and central bank facility use, it is the foreign loans of larger banks that increase, while domestic lending decreases. While this result might appear counterintuitive upon first glance, it is likely capturing foreign acquisitions by some of the largest Canadian banks during the financial crisis of 2008-2009. Perhaps as a result of their relative health compared to their global competitors, and with additional liquidity being provided through the Term PRA facility, many of the largest Canadian banks made foreign acquisitions during the latter half of the sample period (2009-2012), adding foreign loans to their balance sheets. Accordingly, at least some of the decrease in domestic lending growth during this same period can be explained by a re-adjustment of these banks' global portfolios, since *Assets* grow faster than Δ *Domestic Loans* due to the addition of foreign loans through acquisitions.

Table 4 provides examples of big foreign acquisitions made by Canadian banks between 2008 and 2012, when the LIBOR-OIS spread was higher than the first part of our sample period (2006-2007) and the Term PRA was in effect. As seen in these examples, Canadian banks both acquired individual targets and also purchased subsidiaries (or lines of business) from globally active non-Canadian banks. Such acquisitions from other globally active banks during and immediately after the crisis might suggest that large Canadian banks were beneficiaries of fire sales.

Estimating equation (2) only for those Canadian banks with foreign affiliates yields a number of additional findings, which are provided in panel B of table 3. These findings differ from those of panel A for a few reasons. The difference is that these banks with foreign affiliates are also the Big Six largest Canadian banks, which are distinctly different from Canadian banks with cross-border claims but without foreign affiliates. Therefore, some of

the size-related findings in panel A (such as the increase in foreign loans through acquisitions) capture differences *between* the Big Six *and* the non-Big Six banks. On the other hand, by limiting the sample to the Big Six only, the analysis in panel B looks at differences *within* the Big Six related to balance sheet characteristics such as size or internal capital market structure. This is of interest because the foreign acquisitions of the Big Six were markedly different during the crisis.

The results in panel B of table 3 suggest that liquidity risk in the absence of central bank facility use has a limited impact on the lending behavior of Canadian banks with foreign affiliates, with the exception of banks with more core deposits increasing their domestic lending, perhaps in an attempt to capture market share from more wholesale funding-dependent competitors. When the size of the bank is taken into consideration, lending seems to be quite sensitive to liquidity risk during periods of central bank facility use. Larger banks decrease both domestic lending and lending via foreign affiliates at times of liquidity risk and central bank facility use.[17] The slower growth in domestic lending during periods of high LIBOR-OIS and Term PRA facility use may reflect a reluctance by the largest banks to engage in domestic lending at a time when liquidity was tight and banks were borrowing most heavily from the Term PRA.[18] Meanwhile, the decrease in (or slower growth of) lending by foreign affiliates and the increase in funds provided to foreign affiliates by the home office (Δ *Net Due To/Assets*) could indicate that Canadian banks used some of the liquidity support made available by the

[17] Our observation that foreign affiliate lending decreases during times of high LIBOR-OIS and facility use is in contrast to our discussion of foreign acquisitions leading to more foreign loans on the balance sheets of the Big Six banks (which are much bigger than the rest of the banks in the sample used in panel A). However, as mentioned above, the sample in panel B consists of the Big Six banks only, and the pattern of foreign acquisitions differs within this group. For example, while the largest (Royal Bank of Canada) and the two smallest (Canadian Imperial Bank of Commerce and National Bank of Canada) had very few foreign acquisitions during 2008-2010, the second-largest (TD Bank Group) and the two mid-sized (Bank of Montreal and Bank of Nova Scotia) engaged in a number of foreign acquisitions. Therefore, we shouldn't be surprised that the coefficient of *Log Real Assets Ratio * Libor-OIS * Facility* is not positive in foreign lending-related specifications in panel B.

[18] Damar et al. (2014) find that at least some of the Big Six Canadian banks were "exposed" to funding market shocks from the United States, and these exposed banks decreased their supply of non-mortgage consumer credit during 2008-2009. Our findings are also in line with Allen et al. (2011), who argue that the liquidity needs of Canadian banks was greatest in late 2008.

central bank to support affiliates abroad (the most important of them were located in the United States).

Panel B of table 3 yields some additional findings regarding the makeup of globally active Canadian banks' internal capital markets. During times of liquidity risk and central bank facility use, Canadian banks appear to shift funds away from the periphery and toward the core, assuming that some funds had been sent to affiliates in the first place (i.e., a high *Net Due To* at time $t-1$). The uses for the funds obtained from foreign affiliates (or not sent to foreign affiliates) and liquidity assistance received from central bank facilities are associated with more lending, especially domestically. Since Canada was relatively less affected by the global financial crisis, some of the more rapid increase in domestic lending may represent a realignment of these banks' businesses away from the periphery, which was previously supported by the head office, to the core. However, the sensitivity of foreign lending to liquidity risk and central bank facilities through internal capital markets is also positive. Therefore, it is possible that some of the foreign acquisition activity discussed above was financed by the banks' internal capital markets, along with central bank facilities.

It should be kept in mind that this increase in domestic lending coming through internal capital markets is being counteracted by the decrease in domestic lending associated with size. Therefore, we conduct a simple exercise in order to determine both the economic magnitude of each of these two effects (size vs. internal capital markets) and also to get a sense of which effect might dominate. For our sample of banks with foreign affiliates (i.e., the Big Six), we assume that (a) LIBOR-OIS increases by 100 basis points and (b) all banks are using the central bank liquidity facility. The coefficient of the interaction between liquidity risk, central bank facility use and balance sheet size (-0.108 from panel B of table 3) implies that a bank moving from the median balance sheet size (*Log Real Assets*) to the 75^{th} percentile will result in a 9.9% drop in domestic lending. Meanwhile, a similar move from the median to the 75^{th} percentile of *Net Due To* will result in a 7.8% increase in domestic lending (using the coefficient

of 1.265 from panel B of table 3).[19] This exercise suggests that domestic lending in Canada is quite sensitive to liquidity risk and central bank facility use through both balance sheet size and banks' internal capital markets.[20] However, it is likely that these two effects can mostly cancel each other out if balance sheet size and the size/direction of internal capital markets are positively correlated (i.e., if larger Canadian banks are also more likely to provide support to their affiliates).

4 Conclusion

In this paper, we have used panel data methods to explore the question of how Canadian banks fared during the recent financial crisis. Specifically, we looked at how any shocks that happened to the domestic banks were transmitted to foreign subsidiaries.

We found evidence that internal capital markets play a large role in the lending of Canadian banks. We also found evidence that Canadian banks increased their foreign loans during the crisis. Our conclusion is that this is due to the relatively healthy position of Canadian banks vis-à-vis other banking systems, which allowed Canadian banks to expand internationally by buying the fire-sale assets of other banks. One issue with the estimation results comes from the relatively small N and large T structure of the data, which reduces the efficiency of our results. A natural next step would be to use the cointegration methods of Buch and Prieto (2012) to address this.

In addition, anecdotal evidence also supports the interpretation that Canadian banks

[19] Specifically, we take the coefficient of interest and multiply it by the relevant difference between the 75^{th} percentile and the median of the bank characteristic being analyzed. This yields the effect on *(*Δ*Domestic Loans/Assets)*. Multiplying this effect by the median total assets of the median bank in the sample gives us Δ*Domestic Loans*, and dividing this by the median level of *Domestic Loans* gives us the percentage change in the domestic lending of the "median bank."

[20] Repeating this simple exercise for the remaining bank characteristics across our different specifications yields the range for the impact of liquidity on lending discussed in the introduction. Due to space constraints, we are not presenting or discussing the impact on lending implied by other bank characteristics.

aggressively expanded in foreign markets during and shortly after the crisis. This is in line with these estimation results. This bolsters the growing literature (such as Ratnovski and Huang, 2009) that the Canadian banking system fared relatively better during the financial crisis than other banking systems.

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Table 1: **Comparison of Canadian banks.**
Domestically owned banks with both foreign affiliates and cross-border claims versus those with cross-border claims only. Group means are reported for the first and last periods of the sample. Level variables are reported in 2012 CADs.

	Both Affiliates and Cross-Border		Cross-Border Only	
	2006q1	2012q4	2006q1	2012q4
(Loans/Total Assets)	0.531	0.599	0.796	0.809
(Foreign Loans/Total Assets)	0.071	0.085	0.001	0.001
(Liquid Assets/Total Assets)	0.132	0.127	0.122	0.129
ln(Assets)	19.619	20.087	15.669	16.489
(Core Deposits/Liabilities)	0.299	0.294	0.714	0.567
Tier 1 Capital Ratio	8.078	11.102	9.780	12.273
(Total Foreign Claims/Total Assets)	0.287	0.275	0.006	0.002
(Local Claims/Total Assets)	0.246	0.229		
No of countries with claims	54.5	58.3	5.33	6.66
No of banks	6	6	3	3

Table 2: **Summary statistics.**
Summary statistics for the dependent and independent variables for (i) all domestic banks with cross-border claims sample and (ii) sample of banks with foreign affiliates.

	With Cross-Border Claims (n = 10)			With Foreign Affiliates (n = 6)		
	Mean	Median	StDev	Mean	Median	StDev
Observations	235			155		
Dependent Variables						
Δ(Loans)/Assets	0.015	0.015	0.03	0.013	0.014	0.024
Δ(DomLoans)/Assets	0.012	0.008	0.026	0.009	0.007	0.019
Δ(ForLoans)/Assets	0.001	0	0.006	0.002	0.001	0.008
Δ(LiqAssets)/Assets	0.002	0.003	0.021	0.002	0.002	0.018
Δ(NetDueFrom)/Assets				0	0	0.012
Δ(LocalClaims)/Assets				0.003	0.002	0.019
Independent Variables						
(IlliqAssets/Assets)	0.628	0.58	0.139	0.536	0.538	0.057
ln(Assets)	18.533	19.71	1.973	19.855	19.906	0.515
(CoreDep/Liab)	0.43	0.337	0.209	0.3	0.278	0.065
Tier 1 K Ratio (%)	10.974	10.889	2.694	10.855	11.213	2.259
(Net Due To/Liabilities)				0.017	0.027	0.043
Facility Use	0.106	0	0.309	0.135	0	0.343

Table 3: Liquidity Risk and Bank Lending.
This table reports the effects of liquidity risk conditions, central bank facility use, and bank characteristics on growth in all loans (domestic and foreign), domestic loans and foreign loans. Panel A and B respectively observe samples of Canadian banks with cross-border claims and with foreign affiliates. Panel B includes additional regressions for changes in aggregate cross-border claims, foreign-office (i.e., foreign affiliate) claims and net due to (head office from foreign affiliates). Only selected coefficients are presented, for brevity, although the underlying fixed-effects regressions are presented in the appendix (table A2). Reported separately in each panel are the implied marginal effects for periods in which individual institutions used central bank liquidity facilities. The reported coefficients are the linear combination of the coefficients on the respective *LIBOR-OIS* and *LIBOR-OIS * Facility* interaction terms. The data are quarterly from 2006Q1 to 2012Q4. The panel of banks is restricted to those with assets of more than 1 billion CAD for any given quarter. Quarterly observations when the total asset growth rate exceeds 10% are excluded from the sample. Variable definitions are provided in the appendix (table A1). Growth variables are winsorized at the 1st and 99th percentiles. All bank-level explanatory variables are lagged by one quarter. All specifications include bank and time fixed effects. Standard errors are clustered by bank. Results without bank fixed effects are presented in the appendix (table A3). *** is significant at 1%, ** is significant at 5% and * is significant at 10%.

Panel A: Banks with Cross-Border Claims

	ΔLoans /Assets	Δ Domestic Loans /Assets	Δ Foreign Loans /Assets
Illiquid Assets Ratio	-0.172	-0.220*	0.019
	(0.146)	(0.120)	(0.022)
Illiquid Assets Ratio * Libor-OIS	-0.129	0.103	-0.022
	(0.372)	(0.240)	(0.054)
Illiquid Assets Ratio * Libor-OIS * Facility	-0.292	0.085	-0.250
	(0.718)	(0.341)	(0.215)
Log Real Assets	-0.048*	-0.038*	-0.007
	(0.025)	(0.019)	(0.007)
Log Real Assets * Libor-OIS	0.032	0.046*	-0.000
	(0.034)	(0.021)	(0.005)
Log Real Assets * Libor-OIS * Facility	-0.020	-0.100***	0.021*
	(0.060)	(0.025)	(0.010)
Core Deposits Ratio	0.011	0.013	0.007
	(0.040)	(0.028)	(0.009)
Core Deposits Ratio * Libor-OIS	0.308*	0.295**	-0.015
	(0.147)	(0.095)	(0.021)
Core Deposits Ratio * Libor-OIS * Facility	-0.015	-0.856**	0.126
	(0.775)	(0.344)	(0.151)
Tier 1 Ratio	0.002	0.002*	-0.000
	(0.001)	(0.001)	(0.000)
Tier 1 Ratio * Libor-OIS	-0.003	0.001	-0.002
	(0.010)	(0.008)	(0.002)
Tier 1 Ratio * Libor-OIS * Facility	0.031	0.011	-0.011
	(0.083)	(0.039)	(0.022)
Observations	235	235	235
R-squared	0.508	0.557	0.390
Adjusted R-Squared	0.361	0.424	0.207
Number of Banks	10	10	10
Time Period	2006Q1-2012Q4	2006Q1-2012Q4	2006Q1-2012Q4
Central Bank Facility			
Illiquid Assets Ratio	-0.421	0.188	-0.272
Log Real Assets	0.012	-0.054**	0.021**
Core Deposits Ratio	0.293	-0.561	0.111
Tier 1 Ratio	0.028	0.012	-0.013

Panel B: Banks with Foreign Affiliates

	Δ Loans /Assets	Δ Domestic Loans /Assets	Δ Foreign Loans /Assets	Δ Foreign-Office Claims /Assets	Δ Cross-Border Claims /Assets	Δ Net Due To /Assets
Illiquid Assets Ratio	0.009	0.009	0.048	0.110	-0.061	0.127*
	(0.175)	(0.056)	(0.049)	(0.126)	(0.055)	(0.057)
Illiquid Assets Ratio * Libor-OIS	-0.655	-0.322	-0.064	-0.046	0.069	-0.193
	(0.536)	(0.179)	(0.091)	(0.404)	(0.096)	(0.250)
Illiquid Assets Ratio * Libor-OIS * Facility	0.270	0.601**	-0.255	0.190	-0.124	-1.144
	(0.666)	(0.231)	(0.366)	(0.870)	(0.145)	(0.588)
Log Real Assets	-0.027	0.004	-0.022	-0.042	0.005	-0.003
	(0.025)	(0.011)	(0.015)	(0.025)	(0.006)	(0.018)
Log Real Assets * Libor-OIS	-0.077*	-0.022	-0.005	0.012	-0.011	0.054
	(0.033)	(0.018)	(0.008)	(0.048)	(0.012)	(0.052)
Log Real Assets * Libor-OIS * Facility	-0.125***	-0.086***	-0.000	-0.206**	0.025	0.072
	(0.025)	(0.021)	(0.027)	(0.073)	(0.026)	(0.062)
Core Deposits Ratio	-0.100	0.034	-0.088	-0.136	0.031	0.016
	(0.156)	(0.041)	(0.091)	(0.121)	(0.081)	(0.140)
Core Deposits Ratio * Libor-OIS	0.826**	0.225***	0.105	0.468	0.132	-0.295
	(0.228)	(0.042)	(0.110)	(0.262)	(0.099)	(0.214)
Core Deposits Ratio * Libor-OIS * Facility	-0.989	-0.689	-0.098	-1.286**	0.121	0.858
	(1.085)	(0.384)	(0.242)	(0.382)	(0.240)	(0.429)
Tier 1 Ratio	0.003	0.001	0.000	-0.005	-0.000	-0.005
	(0.004)	(0.003)	(0.002)	(0.007)	(0.001)	(0.006)
Tier 1 Ratio * Libor-OIS	-0.001	0.015	-0.006	-0.000	-0.001	0.013
	(0.020)	(0.016)	(0.010)	(0.028)	(0.004)	(0.028)
Tier 1 Ratio * Libor-OIS * Facility	-0.045	-0.009	-0.032	0.047	-0.010	-0.089
	(0.062)	(0.014)	(0.031)	(0.040)	(0.010)	(0.069)
Net Due To	-0.208	-0.155	-0.070	0.106	-0.091*	-0.066
	(0.132)	(0.077)	(0.044)	(0.158)	(0.044)	(0.148)
Net Due To * Libor-OIS	1.351**	0.757	0.294	-0.261	0.364*	-0.642
	(0.507)	(0.451)	(0.183)	(0.799)	(0.155)	(0.586)
Net Due To * Libor-OIS * Facility	1.806**	0.508	0.335	1.572	0.039	-0.764
	(0.452)	(0.298)	(0.350)	(1.300)	(0.298)	(0.700)
Observations	155	155	155	155	155	155
R-squared	0.706	0.814	0.550	0.581	0.329	0.331
Adjusted R-Squared	0.552	0.716	0.314	0.361	-0.023	-0.021
Number of Banks	6	6	6	6	6	6
Time Period	2006Q1-2012Q4	2006Q1-2012Q4	2006Q1-2012Q4	2006Q1-2012Q4	2006Q1-2012Q4	2006Q1-2012Q4
Central Bank Facility						
Illiquid Assets Ratio	-0.385	0.279	-0.319	0.144	-0.055	-1.337*
Log Real Assets	-0.202***	-0.108***	-0.005	-0.194***	0.014	0.126**
Core Deposits Ratio	-0.163	-0.464	0.007	-0.818**	0.253	0.563
Tier 1 Ratio	-0.046	0.006	-0.038	0.047	-0.011	-0.076
Net Due To	3.157***	1.265**	0.629*	1.311*	0.403*	-1.406*

Table 4: Foreign Acquisitions of Large Canadian Banks between 2008 and 2010.
Only select acquisitions with the potential to impact the foreign loan portfolio of Canadian banks are reported (i.e., acquisitions of asset management companies or non-controlling stakes are excluded). All information was obtained from Bloomberg and press reports.

Date	Purchaser	Country/Region	Target
2008Q1	Bank of Montreal	United States	Merchants & Manufacturers Bancorporation Inc. and Ozaukee Bank NA
2008Q1	Royal Bank of Canada	United States	Alabama National BanCorporation
2008Q1	TD Bank Group	United States	Commerce Bancorp Inc.
2009Q4	Bank of Montreal	United States	Diners Club North America (from CitiGroup Inc.)
2010Q1	Bank of Nova Scotia	Columbia	Wholesale Banking Operations of the Royal Bank of Scotland
2010Q3	Bank of Nova Scotia	Brazil	Dresdner Bank Brasil S.A. (from Commerzbank A.G.)
2010Q4	TD Bank Group	United States	South Financial Group

A Appendix: Additional and Detailed Tables

Table A1: Construction of Variables.

Panel A: Dependent Variables

Variable Name	Form Description	Source	Notes
Δ(Loans)/Assets$_{t-1}$	Δ(All loans net of allowance for impairment)/Total Assets	Balance Sheet (M4)	Globally consolidated balance sheet. No data on unused commitments are available
Δ(Domestic Loans)/Assets$_{t-1}$	Δ(All loans net of allowance for impairment booked in Canada)/Total Assets	Regional Distribution of Selected Assets and Liabilities (R2). Assets from Balance Sheet (M4)	Domestic loans are calculated by subtracting "Total International Loans" from "Total Loans" on form R2. Certain categories of loans (such as loans to governments and financial institutions) are excluded from the calculation, since they are not reported on form R2
Δ(Foreign Loans)/Assets$_{t-1}$	Δ(All loans net of allowance for impairment booked internationally)/Total Assets	Regional Distribution of Selected Assets and Liabilities (R2). Assets from Balance Sheet (M4)	Certain categories of loans (such as loans to governments and financial institutions) are excluded from the calculation, since they are not reported on form R2
Δ(Foreign Office Claims)/Assets$_{t-1}$	Δ(Claims booked outside Canada at foreign branches, agencies and corporations controlled by the Bank, and at foreign branches and offices of Canadian corporations controlled by the bank, in all currencies)/Total Assets	Geographic Assets & Liabilities Booked Outside Canada (GR). Assets from Balance Sheet (M4)	All claims are reported gross of any allowances for impairment, per form GR instructions
Δ(Cross-Border Claims)/Assets$_{t-1}$	Δ(Cross-border claims and other assets booked in Canada at head office, Canadian branches and corporations controlled by the bank, and Canadian branches or offices of foreign corporations controlled by the bank, in all currencies)/Total Assets	Geographic Assets & Liabilities Booked in Canada (GQ). Assets from Balance Sheet (M4)	All claims are reported gross of any allowances for impairment, per form GQ instructions
Δ(Net Due To)/Assets$_{t-1}$	Δ(Total head office claims on foreign branches, agencies and consolidated subsidiaries - Total head office liabilities to foreign branches, agencies and consolidated subsidiaries)/Total Assets	Geographic Assets & Liabilities Booked in Canada (GQ). Assets from Balance Sheet (M4)	Claims are reported gross of any allowances for impairment, per form GQ instructions. A positive value of *Net Due To* indicates that foreign affiliates owe a balance to the head office

Panel B: Independent Variables

Variable Name	Form Description	Source	Notes
Illiquid Assets Ratio$_{t-1}$	All loans net of allowance for impairment/Total Assets	Balance Sheet (M4)	Globally consolidated balance sheet. No data on holdings of other potentially illiquid assets, such as asset-backed securities or structured financial products are available for the entire sample period
Log Real Assets$_{t-1}$	ln(Total Assets in 2012 CADs)	Balance Sheet (M4)	Globally consolidated balance sheet

Core Deposits Ratio$_{t-1}$	Demand, notice and time deposits by individuals/Total Assets	Balance Sheet (M4)	Globally consolidated balance sheet
Tier 1 Ratio$_{t-1}$	Tier 1 Capital/Risk-weighted Assets	Basel Capital Adequacy Return (BCAR-BA)	Globally consolidated balance sheet
(Net Due To)$_{t-1}$	(Total head office claims on foreign branches, agencies and consolidated subsidiaries - Total head office liabilities to foreign branches, agencies and consolidated subsidiaries)/Total Liabilities	Geographic Assets & Liabilities Booked in Canada (GQ). Liabilities from Balance Sheet (M4)	Claims are reported gross of any allowances for impairment, per form GQ instructions. A positive value of *Net Due To* indicates that foreign affiliates owe a balance to the head office
Facility ($F_{i,t}$)	A dummy variable that takes the value of one if the bank's net borrowing from the Bank of Canada's Term PRA facility is positive		Confidential data on Term PRA from the Bank of Canada
Banks with Foreign Affiliates	A bank has foreign affiliates if it completes the form GR	Geographic Assets & Liabilities Booked Outside Canada (GR)	

Table A2: Full Regression Results for Liquidity Risk and Bank Lending.
This table reports the underlying regression coefficients for table 3, with both panels combined into one table. Bank group "both" corresponds to Canadian banks with both cross-border claims and foreign affiliates (banks that are represented in panel A of table 3). Bank group "affiliate only" refer to the banks that have foreign affiliates only (banks in panel B of table 3). "Affiliate only" sample includes additional regressions for changes in aggregate cross-border claims, foreign-office (i.e., foreign affiliate) claims and net due to (head office from foreign affiliates). The data are quarterly from 2006Q1 to 2012Q4. The panel of banks is restricted to those with assets of more than 1 billion CAD for any given quarter. Quarterly observations when the total asset growth rate exceeds 10% are excluded from the sample. Definitions of the explanatory variables are provided in the appendix (table A1). Growth variables are winsorized at the 1st and 99th percentiles. All bank-level explanatory variables are lagged by one quarter. All specifications include bank and time fixed effects. Standard errors are clustered by bank. *** is significant at 1%, ** is significant at 5% and * is significant at 10%.

		Δ Domestic	Δ Foreign		Δ Domestic	Δ Foreign	Δ Foreign-Office	Δ Cross-Border	
	ΔLoans	Loans	Loans	ΔLoans	Loans	Loans	Claims	Claims	Δ Net Due To
	/Assets	/Assets	/Assets	/Assets	/Assets	/Assets	/Assets	/Assets	/Assets
Illiquid Assets Ratio	-0.172	-0.220*	0.019	0.009	0.009	0.048	0.110	-0.061	0.127*
	(0.146)	(0.120)	(0.022)	(0.175)	(0.056)	(0.049)	(0.126)	(0.055)	(0.057)
Illiquid Assets Ratio * Libor-OIS	-0.129	0.103	-0.022	-0.655	-0.322	-0.064	-0.046	0.069	-0.193
	(0.372)	(0.240)	(0.054)	(0.536)	(0.179)	(0.091)	(0.404)	(0.096)	(0.250)
Illiquid Assets Ratio * Facility	0.203	0.003	0.126*	0.144	-0.165*	0.132	-0.058	0.088	0.403*
	(0.255)	(0.134)	(0.060)	(0.237)	(0.075)	(0.149)	(0.295)	(0.052)	(0.180)
Illiquid Assets Ratio * Libor-OIS * Facility	-0.292	0.085	-0.250	0.270	0.601**	-0.255	0.190	-0.124	-1.144
	(0.718)	(0.341)	(0.215)	(0.666)	(0.231)	(0.366)	(0.870)	(0.145)	(0.588)
Log Real Assets	-0.048*	-0.038*	-0.007	-0.027	0.004	-0.022	-0.042	0.005	-0.003
	(0.025)	(0.019)	(0.007)	(0.025)	(0.011)	(0.015)	(0.025)	(0.006)	(0.018)
Log Real Assets * Libor-OIS	0.032	0.046*	-0.000	-0.077*	-0.022	-0.005	0.012	-0.011	0.054
	(0.034)	(0.021)	(0.005)	(0.033)	(0.018)	(0.008)	(0.048)	(0.012)	(0.052)
Log Real Assets * Facility	0.017	0.034***	-0.008*	0.059***	0.044***	-0.002	0.079**	-0.017	-0.027
	(0.015)	(0.007)	(0.004)	(0.011)	(0.010)	(0.014)	(0.023)	(0.014)	(0.023)
Log Real Assets * Libor-OIS * Facility	-0.020	-0.100***	0.021*	-0.125***	-0.086***	-0.000	-0.206**	0.025	0.072
	(0.060)	(0.025)	(0.010)	(0.025)	(0.021)	(0.027)	(0.073)	(0.026)	(0.062)
Core Deposits Ratio	0.011	0.013	0.007	-0.100	0.034	-0.088	-0.136	0.031	0.016
	(0.040)	(0.028)	(0.009)	(0.156)	(0.041)	(0.091)	(0.121)	(0.081)	(0.140)
Core Deposits Ratio * Libor-OIS	0.308*	0.295**	-0.015	0.826**	0.225***	0.105	0.468	0.132	-0.295
	(0.147)	(0.095)	(0.021)	(0.228)	(0.042)	(0.110)	(0.262)	(0.099)	(0.214)
Core Deposits Ratio * Facility	0.044	0.280*	-0.066	0.384	0.252*	0.021	0.388**	-0.022	-0.157
	(0.226)	(0.126)	(0.049)	(0.320)	(0.115)	(0.092)	(0.129)	(0.080)	(0.088)
Core Deposits Ratio * Libor-OIS * Facility	-0.015	-0.856**	0.126	-0.989	-0.689	-0.098	-1.286**	0.121	0.858
	(0.775)	(0.344)	(0.151)	(1.085)	(0.384)	(0.242)	(0.382)	(0.240)	(0.429)
Tier 1 Ratio	0.002	0.002*	-0.000	0.003	0.001	0.000	-0.005	-0.000	-0.005
	(0.001)	(0.001)	(0.000)	(0.004)	(0.003)	(0.002)	(0.007)	(0.001)	(0.006)
Tier 1 Ratio * Libor-OIS	-0.003	0.001	-0.002	-0.001	0.015	-0.006	-0.000	-0.001	0.013
	(0.010)	(0.008)	(0.002)	(0.020)	(0.016)	(0.010)	(0.028)	(0.004)	(0.028)
Tier 1 Ratio * Facility	-0.006	-0.000	0.003	0.021	0.007	0.013	-0.015	0.006	0.028
	(0.022)	(0.010)	(0.007)	(0.016)	(0.004)	(0.009)	(0.010)	(0.003)	(0.019)
Tier 1 Ratio * Libor-OIS * Facility	0.031	0.011	-0.011	-0.045	-0.009	-0.032	0.047	-0.010	-0.089
	(0.083)	(0.039)	(0.022)	(0.062)	(0.014)	(0.031)	(0.040)	(0.010)	(0.069)

Net Due To				-0.208	-0.155	-0.070	0.106	-0.091*	-0.066
				(0.132)	(0.077)	(0.044)	(0.158)	(0.044)	(0.148)
Net Due To * Libor-OIS				1.351**	0.757	0.294	-0.261	0.364*	-0.642
				(0.507)	(0.451)	(0.183)	(0.799)	(0.155)	(0.586)
Net Due To * Facility				-0.714**	-0.494***	-0.232	-0.379	-0.047	0.386
				(0.231)	(0.118)	(0.181)	(0.469)	(0.163)	(0.307)
Net Due To * Libor-OIS * Facility				1.806**	0.508	0.335	1.572	0.039	-0.764
				(0.452)	(0.298)	(0.350)	(1.300)	(0.298)	(0.700)
Libor-OIS * Facility	0.250	2.120***	-0.214	3.212**	1.745**	0.496	3.878***	-0.345	-0.132
	(1.650)	(0.637)	(0.405)	(0.819)	(0.483)	(0.332)	(0.691)	(0.448)	(1.259)
Facility	-0.413	-0.783***	0.078	-1.619***	-0.954***	-0.166	-1.498***	0.233	0.054
	(0.486)	(0.186)	(0.143)	(0.194)	(0.226)	(0.191)	(0.293)	(0.244)	(0.528)
Observations	235	235	235	155	155	155	155	155	155
R-squared	0.508	0.557	0.39	0.706	0.814	0.55	0.581	0.329	0.331
Adjusted R-Squared	0.361	0.424	0.207	0.552	0.716	0.314	0.361	-0.023	-0.021
Number of Banks	10	10	10	6	6	6	6	6	6
Bank Category	Both	Both	Both	Affiliate Only	Affiliate Only	Affiliate Only	Affiliate Only	Affiliate Only	Affiliate Only
Time Period	2006Q1-2012Q4	2006Q1-2012Q4	2006Q1-2012Q4	2006Q1-2012Q4	2006Q1-2012Q4	2006Q1-2012Q4	2006Q1-2012Q4	2006Q1-2012Q4	2006Q1-2012Q4

Table A3: Liquidity Risk and Bank Lending, excluding Bank Fixed Effects.
This table reports results that are identical to those in table 3, except the specifications in this table exclude bank fixed effects. Panel A and B respectively observe samples of Canadian banks with cross-border claims and with foreign affiliates. Panel B includes additional regressions for changes in aggregate cross-border claims, foreign-office (i.e., foreign affiliate) claims and net due to (head office from foreign affiliates). Reported separately in each panel are the implied marginal effects for periods in which individual institutions used central bank liquidity facilities. The reported coefficients are the linear combination of the coefficients on the respective *LIBOR-OIS* and *LIBOR-OIS * Facility* interaction terms. The data are quarterly from 2006Q1 to 2012Q4. The panel of banks is restricted to those with assets of more than 1 billion CAD for any given quarter. Quarterly observations when the total asset growth rate exceeds 10% are excluded from the sample. Variable definitions are provided in the appendix (table A1). Growth variables are winsorized at the 1st and 99th percentiles. All bank-level explanatory variables are lagged by one quarter. All specifications include time fixed effects. Standard errors are clustered by bank. *** is significant at 1%, ** is significant at 5% and * is significant at 10%.

Panel A: Banks with Cross-Border Claims

	ΔLoans /Assets	Δ Domestic Loans /Assets	Δ Foreign Loans /Assets
Illiquid Assets Ratio	-0.003	-0.060	0.010
	(0.149)	(0.116)	(0.009)
Illiquid Assets Ratio * Libor-OIS	0.001	0.248	-0.021
	(0.521)	(0.381)	(0.046)
Illiquid Assets Ratio * Libor-OIS * Facility	-0.710	-0.378	-0.189
	(0.910)	(0.558)	(0.205)
Log Real Assets	-0.012	-0.018	0.001
	(0.014)	(0.011)	(0.001)
Log Real Assets * Libor-OIS	0.048	0.064	-0.001
	(0.051)	(0.038)	(0.004)
Log Real Assets * Libor-OIS * Facility	-0.007	-0.086**	0.014
	(0.069)	(0.033)	(0.010)
Core Deposits Ratio	-0.084	-0.087	0.005
	(0.057)	(0.050)	(0.003)
Core Deposits Ratio * Libor-OIS	0.357*	0.337**	-0.014
	(0.160)	(0.132)	(0.020)
Core Deposits Ratio * Libor-OIS * Facility	0.490	-0.317	0.041
	(0.854)	(0.483)	(0.139)
Tier 1 Ratio	-0.000	-0.000	0.000
	(0.002)	(0.002)	(0.000)
Tier 1 Ratio * Libor-OIS	-0.000	0.003	-0.001
	(0.010)	(0.009)	(0.002)
Tier 1 Ratio * Libor-OIS * Facility	0.027	0.008	-0.011
	(0.088)	(0.045)	(0.020)
Observations	235	235	235
R-squared	0.236	0.422	0.333
Adjusted R-Squared	0.383	0.285	0.174
Number of Banks	10	10	10
Time Period	2006Q1-2012Q4	2006Q1-2012Q4	2006Q1-2012Q4
Central Bank Facility			
Illiquid Assets Ratio	-0.709	-0.13	-0.21
Log Real Assets	0.041	-0.022	0.013
Core Deposits Ratio	0.847	0.02	0.027
Tier 1 Ratio	0.027	0.011	-0.012

Panel B: Banks with Foreign Affiliates

	Δ Loans /Assets	Δ Domestic Loans /Assets	Δ Foreign Loans /Assets	Δ Foreign-Office Claims /Assets	Δ Cross-Border Claims /Assets	Δ Net Due To /Assets
Illiquid Assets Ratio	0.062	0.024	0.010	0.023	-0.044	0.024
	(0.068)	(0.022)	(0.021)	(0.084)	(0.025)	(0.066)
Illiquid Assets Ratio * Libor-OIS	-0.429	-0.209	0.025	0.111	0.089	-0.100
	(0.428)	(0.113)	(0.096)	(0.354)	(0.080)	(0.288)
Illiquid Assets Ratio * Libor-OIS * Facility	-0.382	0.398	-0.468	-0.101	-0.164	-1.124*
	(0.573)	(0.261)	(0.404)	(0.743)	(0.089)	(0.552)
Log Real Assets	0.023***	0.006	0.002	-0.001	0.006**	-0.003
	(0.003)	(0.003)	(0.002)	(0.008)	(0.002)	(0.010)
Log Real Assets * Libor-OIS	-0.102**	-0.033	-0.004	0.004	-0.020***	0.058
	(0.029)	(0.021)	(0.014)	(0.050)	(0.005)	(0.053)
Log Real Assets * Libor-OIS * Facility	-0.033	-0.057**	0.015	-0.186**	0.037	0.042
	(0.047)	(0.016)	(0.036)	(0.070)	(0.020)	(0.067)
Core Deposits Ratio	-0.089**	-0.027	-0.002	-0.113	-0.036	0.023
	(0.033)	(0.016)	(0.019)	(0.065)	(0.018)	(0.046)
Core Deposits Ratio * Libor-OIS	0.583**	0.206**	0.032	0.484	0.151*	-0.149
	(0.164)	(0.066)	(0.073)	(0.267)	(0.073)	(0.193)
Core Deposits Ratio * Libor-OIS * Facility	-0.613	-0.760	-0.045	-1.516**	0.074	0.364
	(0.943)	(0.459)	(0.179)	(0.440)	(0.201)	(0.443)
Tier 1 Ratio	0.005	0.003	0.003	0.001	0.000	0.000
	(0.004)	(0.003)	(0.002)	(0.007)	(0.001)	(0.006)
Tier 1 Ratio * Libor-OIS	-0.008	0.004	-0.017*	-0.024	-0.001	-0.018
	(0.018)	(0.012)	(0.008)	(0.032)	(0.005)	(0.025)
Tier 1 Ratio * Libor-OIS * Facility	-0.063	-0.003	-0.029	0.061	-0.011	-0.051
	(0.048)	(0.019)	(0.026)	(0.036)	(0.008)	(0.071)
Net Due To	-0.328***	-0.174**	-0.068*	0.147	-0.103**	0.062
	(0.077)	(0.056)	(0.033)	(0.151)	(0.029)	(0.103)
Net Due To * Libor-OIS	1.614**	0.816*	0.229	-0.413	0.425**	-0.967
	(0.497)	(0.341)	(0.245)	(0.854)	(0.118)	(0.582)
Net Due To * Libor-OIS * Facility	0.630	0.068	-0.013	1.047	-0.064	-0.708
	(0.541)	(0.316)	(0.422)	(1.163)	(0.281)	(0.741)
Observations	155	155	155	155	155	155
R-squared	0.660	0.793	0.502	0.565	0.316	0.279
Adjusted R-Squared	0.507	0.699	0.277	0.368	0.006	-0.048
Number of Banks	6	6	6	6	6	6
Time Period	2006Q1-2012Q4	2006Q1-2012Q4	2006Q1-2012Q4	2006Q1-2012Q4	2006Q1-2012Q4	2006Q1-2012Q4
Central Bank Facility						
Illiquid Assets Ratio	-0.811	0.189	-0.443	0.01	-0.075	-1.224*
Log Real Assets	-0.135**	-0.09**	0.011	-0.182***	0.017	0.100*
Core Deposits Ratio	-0.03	-0.554	-0.013	-1.032***	0.225	0.215
Tier 1 Ratio	-0.071	0.001	-0.046	0.037	-0.012	-0.069
Net Due To	2.244***	0.884**	0.216	0.634	0.361	-1.675*

Table A4: Liquidity Risk and Bank Lending, with US Dollar LIBOR-OIS Spread.
This table reports results that are identical to those in table 3, except the specifications in this table use the USD LIBOR-OIS spread as a measure of liquidity. Panel A and B respectively observe samples of Canadian banks with cross-border claims and with foreign affiliates. Panel B includes additional regressions for changes in aggregate cross-border claims, foreign-office (i.e., foreign affiliate) claims and net due to (head office from foreign affiliates). Reported separately in each panel are the implied marginal effects for periods in which individual institutions used central bank liquidity facilities. The reported coefficients are the linear combination of the coefficients on the respective *USD LIBOR-OIS* and *USD LIBOR-OIS * Facility* interaction terms. The data are quarterly from 2006Q1 to 2012Q4. The panel of banks is restricted to those with assets of more than 1 billion CAD for any given quarter. Quarterly observations when the total asset growth rate exceeds 10% are excluded from the sample. Variable definitions are provided in the appendix (table A1). Growth variables are winsorized at the 1st and 99th percentiles. All bank-level explanatory variables are lagged by one quarter. All specifications include bank and time fixed effects. Standard errors are clustered by bank. *** is significant at 1%, ** is significant at 5% and * is significant at 10%.

Panel A: Banks with Cross-Border Claims

	ΔLoans /Assets	Δ Domestic Loans /Assets	Δ Foreign Loans /Assets
Illiquid Assets Ratio	-0.143	-0.153**	0.021
	(0.079)	(0.065)	(0.013)
Illiquid Assets Ratio * USD Libor-OIS	-0.179	-0.108	-0.038**
	(0.144)	(0.127)	(0.012)
Illiquid Assets Ratio *USD Libor-OIS * Facility	0.110	-0.016	0.019
	(0.266)	(0.137)	(0.106)
Log Real Assets	-0.026	-0.020	-0.002
	(0.035)	(0.031)	(0.006)
Log Real Assets * USD Libor-OIS	0.001	0.005	-0.003***
	(0.010)	(0.008)	(0.001)
Log Real Assets *USD Libor-OIS * Facility	-0.003	-0.015	0.005
	(0.021)	(0.010)	(0.003)
Core Deposits Ratio	0.069	0.069*	0.010
	(0.039)	(0.032)	(0.010)
Core Deposits Ratio * USD Libor-OIS	0.149*	0.129*	-0.007
	(0.067)	(0.067)	(0.009)
Core Deposits Ratio *USD Libor-OIS * Facility	-0.059	-0.023	0.082
	(0.285)	(0.105)	(0.073)
Tier 1 Ratio	0.003	0.004*	-0.000
	(0.002)	(0.002)	(0.000)
Tier 1 Ratio * USD Libor-OIS	-0.001	-0.000	-0.001**
	(0.004)	(0.005)	(0.000)
Tier 1 Ratio *USD Libor-OIS * Facility	0.013	-0.009	0.011
	(0.034)	(0.020)	(0.013)
Observations	235	235	235
R-squared	0.515	0.562	0.408
Adjusted R-Squared	0.369	0.431	0.231
Number of Banks	10	10	10
Time Period	2006Q1-2012Q4	2006Q1-2012Q4	2006Q1-2012Q4
Central Bank Facility			
Illiquid Assets Ratio	-0.069	-0.124	-0.019
Log Real Assets	-0.002	-0.010**	0.002
Core Deposits Ratio	0.09	0.106	0.075
Tier 1 Ratio	0.012	-0.009	0.01

Panel B: Banks with Foreign Affiliates

	Δ Loans /Assets	Δ Domestic Loans /Assets	Δ Foreign Loans /Assets	Δ Foreign-Office Claims /Assets	Δ Cross-Border Claims /Assets	Δ Net Due To /Assets
Illiquid Assets Ratio	-0.044	-0.028	0.048	0.150	-0.054	0.073
	(0.128)	(0.044)	(0.029)	(0.085)	(0.046)	(0.046)
Illiquid Assets Ratio * USD Libor-OIS	-0.321	-0.133	0.011	-0.053	0.021	0.063
	(0.282)	(0.085)	(0.069)	(0.199)	(0.026)	(0.138)
Illiquid Assets Ratio *USD Libor-OIS * Facility	0.399	0.208***	0.063	-0.076	0.032	-0.278
	(0.277)	(0.043)	(0.071)	(0.246)	(0.108)	(0.161)
Log Real Assets	-0.005	0.022	-0.015	-0.027*	0.006	-0.006
	(0.035)	(0.015)	(0.012)	(0.011)	(0.004)	(0.015)
Log Real Assets * USD Libor-OIS	-0.041	-0.011	-0.010	0.012	-0.004	0.016
	(0.023)	(0.014)	(0.014)	(0.024)	(0.011)	(0.021)
Log Real Assets *USD Libor-OIS * Facility	-0.013	-0.015	0.001	-0.051	0.005	0.006
	(0.021)	(0.010)	(0.010)	(0.029)	(0.012)	(0.017)
Core Deposits Ratio	0.075	0.113**	-0.065	-0.013	0.063	-0.062
	(0.148)	(0.042)	(0.067)	(0.098)	(0.075)	(0.100)
Core Deposits Ratio * USD Libor-OIS	0.265**	-0.005	-0.045	0.083	0.045	-0.121
	(0.082)	(0.047)	(0.053)	(0.077)	(0.050)	(0.110)
Core Deposits Ratio *USD Libor-OIS * Facility	-0.450	-0.111	0.114	-0.098	-0.025	0.165
	(0.263)	(0.129)	(0.116)	(0.135)	(0.081)	(0.211)
Tier 1 Ratio	0.001	0.004*	-0.001	-0.005	-0.001	-0.003**
	(0.003)	(0.002)	(0.001)	(0.003)	(0.001)	(0.001)
Tier 1 Ratio * USD Libor-OIS	0.006	-0.000	-0.000	0.002	-0.000	0.004
	(0.009)	(0.004)	(0.002)	(0.008)	(0.004)	(0.004)
Tier 1 Ratio *USD Libor-OIS * Facility	0.000	0.007	0.019	0.006	0.005	-0.008
	(0.047)	(0.008)	(0.016)	(0.020)	(0.009)	(0.012)
Net Due To	-0.082	-0.078*	-0.017	0.057	-0.027	-0.128
	(0.095)	(0.035)	(0.016)	(0.114)	(0.018)	(0.077)
Net Due To * USD Libor-OIS	0.572	0.267	0.045	-0.150	0.089	-0.250
	(0.330)	(0.203)	(0.170)	(0.354)	(0.113)	(0.241)
Net Due To *USD Libor-OIS * Facility	0.192	-0.008	0.163	0.431	-0.019	-0.032
	(0.344)	(0.163)	(0.144)	(0.436)	(0.133)	(0.194)
Observations	155	155	155	155	155	155
R-squared	0.691	0.812	0.571	0.577	0.314	0.331
Adjusted R-Squared	0.529	0.713	0.347	0.355	-0.046	-0.021
Number of Banks	6	6	6	6	6	6
Time Period	2006Q1-2012Q4	2006Q1-2012Q4	2006Q1-2012Q4	2006Q1-2012Q4	2006Q1-2012Q4	2006Q1-2012Q4
Central Bank Facility						
Illiquid Assets Ratio	0.078	0.075	0.074	-0.129	0.053	-0.215
Log Real Assets	-0.054*	-0.026**	-0.009	-0.039**	0.001	0.022**
Core Deposits Ratio	-0.185	-0.116	0.069	-0.015	0.02	0.044
Tier 1 Ratio	0.006	0.007	0.019	0.008	0.005	-0.004
Net Due To	0.764***	0.259***	0.208**	0.281**	0.07	-0.282**